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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/213,613	12/18/1998	REEMA GUPTA	19898/5	6656

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ART UNIT	PAPER NUMBER
2154	

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Please find below and/or attached an Office communication concerning this application or proceeding.

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE ___*three*___ MONTH(S) FROM
THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136 (a). In no event, however, may a reply be timely filed
  after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will
  be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this
  communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any
  earned patent term adjustment. See 37 CFR 1.704(b).

Status

1) ☒ Responsive to communication(s) filed on *Feb 26, 2002*

2a) ☒ This action is **FINAL.**   2b) ☐ This action is non-final.

3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is
closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11; 453 O.G. 213.

Disposition of Claims

4) ☒ Claim(s) *1-9* is/are pending in the application.

    4a) Of the above, claim(s) _____ is/are withdrawn from consideratio

5) ☐ Claim(s) _____ is/are allowed.

6) ☒ Claim(s) *1-9* is/are rejected.

7) ☐ Claim(s) _____ is/are objected to.

8) ☐ Claims _____ are subject to restriction and/or election requirement

Application Papers

9) ☐ The specification is objected to by the Examiner.

10) ☐ The drawing(s) filed on _____ is/are objected to by the Examiner.

11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved.

12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. § 119

13) ☐ Acknowledgement is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d).

  a) ☐ All b) ☐ Some* c) ☐ None of:

    1. ☐ Certified copies of the priority documents have been received.

    2. ☐ Certified copies of the priority documents have been received in Application No. _____ .

    3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage
        application from the International Bureau (PCT Rule 17.2(a)).

  *See the attached detailed Office action for a list of the certified copies not received.

14) ☐ Acknowledgement is made of a claim for domestic priority under 35 U.S.C. § 119(e).

Attachment(s)

15) ☒ Notice of References Cited (PTO-892)

16) ☒ Notice of Draftsperson's Patent Drawing Review (PTO-948)

17) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s). _____

18) ☐ Interview Summary (PTO-413) Paper No(s). _____

19) ☐ Notice of Informal Patent Application (PTO-152)

20) ☐ Other:

Part III   DETAILED ACTION

Remarks

1.   Claims 1-9 are presented for examination.

Claim Rejections - 35 USC § 103

2.   The following is a quotation of 35 U.S.C. 103(a) which forms

the basis for all obviousness rejections set forth in this Office

action:

> (a) A patent may not be obtained though the invention is not identically
> disclosed or described as set forth in section 102 of this title, if the
> differences between the subject matter sought to be patented and the prior
> art are such that the subject matter as a whole would have been obvious at
> the time the invention was made to a person having ordinary skill in the
> art to which said subject matter pertains. Patentability shall not be
> negatived by the manner in which the invention was made.

3.   This application currently names joint inventors. In
considering patentability of the claims under 35 U.S.C. 103(a),
the examiner presumes that the subject matter of the various
claims was commonly owned at the time any inventions covered
therein were made absent any evidence to the contrary. Applicant
is advised of the obligation under 37 CFR 1.56 to point out the
inventor and invention dates of each claim that was not commonly
owned at the time a later invention was made in order for the
examiner to consider the applicability of 35 U.S.C. 103(c) and
potential 35 U.S.C. 102(f) or (g) prior art under 35
U.S.C. 103(a).

4.   Claims 1-3 and 5-9 are rejected under 35 U.S.C. 103(a) as

being unpatentable over Kedem, U.S. Patent No. 6,167,485, in view

of van der Wal, A., "Efficient Interprocessor Communication in a

Tightly Coupled Homogenous Multiprocessor System," Proc. of the

IEEE Workshop on Future Trends of Distributed Computing Systems,

IEEE, pp. 362-368, October 1990.

5.   Regarding claim 1, Kedem teaches the invention substantially

as claimed by disclosing a system comprising a shared service

processor (Fig. 4 elem. 47) providing a single point of contact

for a user (Col. 10 lines 23-29) interfacing with at least one

line processor (Fig. 4 elem. 42 where the host adapter

implemented using general purpose processor per Col. 9 lines 34-

39; Fig. 4 elems. 45a-45d where the disk adapters are implemented

using general purpose processors per Col. 9 lines 45-47), the

shared processor in electrical communication with shared memory

(Fig. 4 elem. 43 shared cache memory). Kedem teaches that the

host adapter processor and the disk adapter processors

communicate using mailboxes in the shared cache memory (Col. 10

lines 12-22). Kedem also teaches how the data verification and

repair process is implemented by a primary disk adapter processor

that uses mailboxes to send commands to and receive responses

from secondary disk adapter processors (Col. 13 lines 1-15).

6.   Kedem however does not specifically teach how the service

processor communicates with the host adapter processor and the

disk adapter processors. More specifically, Kedem does not teach

a shared memory including mailboxes operable to enable

communication between the at least one line processor and the

service processor. Nor does Kedem specifically teach a system

wherein:

a.   The service processor is operable to selectively

deliver commands to a respective mailbox of a selected one of

said at least one line processor; and

b.   the service processor is selective operable to issue a

system management interrupt to any or all of the at least one

line processors, the interrupt signaling to the at least one line

processor to access a respective mailbox in the shared memory.

7.   It would have been obvious to one of ordinary skill in the

art at the time the invention was made to modify the system of

Kedem to use mailboxes in the shared cache memory to provide

communication between the service processor and the host and disk

adapter processors. Kedem teaches that the service processor can

be programmed to perform the data verification and repair process

functions of the primary disk adapter (Col. 12 lines 14-17).

From this teaching, a person of ordinary skill in the art at the

time the invention was made would make the modification discussed

above because using a common interprocessor communication scheme

throughout the system would allow the system designer to reuse

the existing code implementing mailboxes, thus reducing

development costs.

8.   As modified, Kedem teaches a system in which the service

processor is operable to deliver commands to a respective mailbox

of a selected one of said at least one processor (Col. 10 lines

12-2 describing mailboxes; Col. 13 lines 1-15 with service

processor commanding the primary and passive disk adapters to

write data into cache by writing to the mailbox).

9.   However, Kedem as modified does not explicitly describe a

system in which the service processor is selectively operable to

issue a system management interrupt to any or all of the at least

one line processors, the interrupt signaling the at least one

line processor to access a respective mailbox in the shared

memory.

10.   On the other hand, van der Wal teaches a mailbox-based

interprocessor communication system in which the sending

processor generates an interrupt to attract the attention of the

target processor after writing a message to a mailbox (p. 362

Col. 2 second complete paragraph).

11.   It would have been obvious to one of ordinary skill in the

art at the time the invention was made to combine van der Wal's

teaching regarding the use of interrupts to indicate to the

intended recipient processor that a message is available in the

mailbox with the mailbox interprocessor communication system of

Kedem.   In the resulting combination, the service processor would

issue an interrupt to the selected line processor after writing a

command to the respective mailbox. In addition, the line

processor would issue an interrupt to the service processor after

writing an appropriate response to the mailbox. As to

motivation, although Kedem does not explicitly describe how the

processors determine whether messages are available in the

mailbox, a person of ordinary skill in the art at the time the

invention was made would have recognized that Kedem's system

could not function without this ability. Given the art-

recognized choices of polling or using interrupts, a person of

ordinary skill in the art at the time the invention was made

would have selected the interrupt based system because, as van

der Wal explicitly teaches, using interrupts reduces bus

contention (p. 132 Col. 2 second complete paragraph). Reducing

bus contention is an important consideration in a bus-based

system like Kedem.

12. As to claim 2, the combination of Kedem in view of van der

Wal as applied to claim 1 above teaches these features. Kedem

teaches a system in which the line processor accesses the command

delivered to a respective mailbox, interprets the command, and

then delivers an appropriate response to a mailbox (Col. 13 lines

9-15). These actions occur in response to the line processor

receiving a system management interrupt for the reasons given above in paragraph 13.

13. As to claim 3, the combination of Kedem in view of van der Wal teaches a system wherein the line processor is operable to assert its system management interrupt line to the service processor after delivering the appropriate response to the mailbox for the reasons discussed above in paragraph 13.

14. As to claim 5, Kedem teaches a system in which the at least one line processor is operable to conserve backplane bandwidth by selectively consolidating selected tasks onto the service processor to reduce the number of accesses to the backplane (Col. 11 lines 21-41 host adapter/line processor initiating verification and repair process *by* the service processor after periods of heavy activity).

15. As to claim 6, it is a method claim that generally corresponds to apparatus claim 1 except for the following limitations. Claim 6 refers to a shared processor that corresponds to the shared service processor of claim 1. In addition, claim 6 at lines 5-6 includes the limitation of providing mailboxes *at* the shared processor. This language requires the mailboxes to be located with the shared processor. Kedem Figure 4 shows a bus interconnecting the host adapter (elem. 42), disk adapters (elems. 45a-45d), shared memory (elem.

44), and the service processor (elem. 47). A person of ordinary skill in the art at the time the invention was made would have recognized that Figure 7 describes the electrical interconnection of the components and does not necessarily represent their physical placement. It would have been obvious to one of ordinary skill in the art at the time the invention was made to physically locate the shared memory with the service processor, by placing them on the same board in order to conserve space. As to any limitation not specifically discussed, the reasons for rejection should be apparent from the discussion of claim 1 above.

16. As to claims 7-8, they are method claims whose additional limitations correspond to those introduced in apparatus claims 2-3 respectively. They are therefore rejected for the same reasons.

17. As to claim 9, the comments with respect to claim 5 above apply equally to claim 9. As to the additional limitation of a command delivered to the mailboxes by the at least one line processor, Kedem teaches this feature by teaching a host adapter/line processor commanding the service processor to begin the verification process (Col. 11 lines 38-40).

18. Claim 4 is rejected under 35 U.S.C. 103(a) as being

unpatentable over Kedem, U.S. Patent No. 6,167,485, in view of

van der Wal, as applied to claim 1 above, and further in view of

Sato et al., U.S. Patent No. 5,133,071.

19. As to claim 4, the combination of Kedem in view of van der

Wal teaches the invention substantially as claimed. See the

rejection of claim 1 above.

20. The combination of Kedem in view of van der Wal does not

teach a system in which the service processor is electrically

connected to nonvolatile memory for storing initialization and/or

boot information for the service processor and at least one

processor.

21. Sato on the other hand teaches a service processor

electrically coupled to a nonvolatile memory/disk drive (Col. 1

lines 17-21). The disk drive stores operating programs for

embedded processors/channel controllers. The service processor

loads these operating programs into memory when the system powers

on (Col. 1 lines 17-26). These operating programs are

initialization and/or boot information. Upon considering Sato's

teachings, a person of ordinary skill in the art at the time the

invention was made would have recognized that Sato's teaching is

merely a specific example of the general principle of having a

service processor configure a system by loading the executable

code for an embedded processor at power up.

22. It would have been obvious to one of ordinary skill in the

art at the time the invention was made to combine Sato's teaching

with the system of the combination of Kedem in view of van der

Wal by attaching a disk drive to the Kedem's service processor

and then having Kedem's service processor load executable

programs from the disk drive into the memories of the host and

disk adapter processors at power up. Kedem teaches that the

service processor configures the components of the storage system

(Col. 10 lines 26-27). Based on this teaching, a person of

ordinary skill in the art at the time the invention was made

would have made the combination because storing the host and disk

adapter programs on the service processor's disk drive rather

than in ROM co-located with the individual processors would make

software upgrades easier.

23. As to the service processor, Sato does not explicitly teach

that the service processor boots from its attached disk drive.

However, official notice is hereby take of the fact that

processors with attached disk drives commonly boot from programs

stored on the attached disk. It would therefore have been

obvious to one of ordinary skill in the art at the time the

invention was made to combine the teaching of which official

notice is taken with the system of the combination of Kedem in view of van der Wal and further in view of Sato by having the nonvolatile memory attached to the service processor store initialization and/or boot information for the service processor. This combination would have been obvious because storing the service processor boot and/or initialization information on the attached disk drive makes upgrades to the service processor software easier.

Response to Arguments

24. Applicant's arguments filed on February 25, 2002 (paper no. 10) have been fully considered but they are not persuasive.

25. The Applicants are arguing in substance the following: (a) Kedem does not teach a system in which the line processors are accessible to the user *only* via the shared service processor; (b) Kedem teaches away from the claimed invention because it describes using the service processor to perform data verification and repair as an alternative embodiment; (c) Kedem does not provide an enabling disclosure as to how the service processor would perform the data verification process; (d) the motivation to modify Kedem to use mailboxes is impermissible hindsight; (e) the combination of Kedem in view of van der Wal does not teach a system wherein commands delivered to mailboxes

by a line processor are consolidated by a service processor to reduce the number of access to a backplane.

26. As to point (a), it is first noted that the claim language at issue does not use the word *only*. The claim language refers to a *single* point of contact. Although one definition of the word single is *sole*, another definition is *distinct*. See Webster's II New College Dictionary, Houghton Mifflin Co., p. 1030, 1995. Assuming without conceding the correctness of the Applicant's assertion, that Kedem does not teach a system in which the line processors are accessible to the user *only* via the shared service processor, Kedem does teach a distinct service processor. So in this sense, Kedem teaches a service processor providing a single point of contact for a user, and the argument is therefore not persuasive.

27. As to point (a), it is also noted that Kedem teaches a service processor connected to a display, keyboard, and other I/O devices to permit an operator to use the service processor for configuring the components of the storage system and for running or initiating diagnosis or maintenance facilities (Col. 10 lines 23-28). Since these I/O devices are only connected to the service processor, this operator/user can only interact with "components" of the system (i.e., the line processors) via the service processor. Kedem therefore teaches a service processor

that provides a single point of contact for the user interfacing with at least one line processor.

28.   As to point (b), an alternate embodiment, even if less desirable, does not teach away from the claimed invention. See, In re Gurley, 27 F.3d 551, 554, 31 USPQ2d 1130, 1132 (Fed. Cir. 1994).

29.   As to point (c), the Applicant asserts that the combination of Kedem in view of van der Wal cannot render the claimed invention obvious because Kedem does not teach how the data verification process would be performed if the service processor were instead used to initiate it. In other words, the Applicants assert that Kedem does not provide an enabling disclosure with respect to this feature. It is noted that Kedem includes claims written in means plus function form directed to the verification process. See claim 5 including means for comparing and means for determining. Means plus function limitations are construed to include corresponding structure disclosed in the specification and equivalents. 35 U.S.C. 112(6). In this case, the service processor is structure disclosed as implementing the verification functions of claim 5. Accordingly, the service processor performing this function is claimed subject matter. U.S. Patents are presumed to be enabling. 35 U.S.C. 282. When Kedem's failure to explicitly describe how the service processor

implements the verification process is considered in view of the
presumption of validity, the Examiner concludes that a person of
ordinary skill in the art, based on Kedem's description of how
the disk adapter would implement this function, would be able to
implement the verification process using the service processor
without undue experimentation. The Applicants' argument is
therefore deemed unpersuasive.

30. As to point (d), the Applicants assert that the motivation
to modify Kedem by van der Wal is impermissible hindsight because
it is equally likely that the mailbox code would require
modification to support mailbox interaction between the service
processor and other processors. The Examiner agrees that the
existing mailbox code would require some minor modifications.
Specifically, the code would have to be modified to use the
addresses of the mailboxes used for service processor/line
processor communication. There is no evidence on the record that
these modifications would be significant or would constitute
undue experimentation. After all, the Applicants' own
disclosure, in discussing the embodiment on pages 122-128 of the
specification, provides no code for implementing these functions
and speaks only in broad functional terms. So when the
Applicants' own lack of detailed disclosure is compared to the
teachings of the combination of Kedem in view of van der Wal, the

Examiner concludes that the modifications to Kedem's mailbox code

must be within the ordinary skill in the art without undue

experimentation. Otherwise, the Applicants would have disclosed

details of how to implement the mailbox functionality. For this

reason, the Applicants' argument is not deemed persuasive.

31. As to point (e), the consolidation occurs when the service

processor performs the verification function described in the

remainder of the patent.

32. As a general response, Kedem teaches that its invention is

embodied in the Symmetrix Model 55XX (Col. 9 lines 4-16). This

product manual may contain evidence as to whether it is within

the level of ordinary skill in the art to use mailboxes for

communication between the service processor and the adapters of

Kedem as embodied in the Symmetrix Model 55XX.   It is noted that

this application incorporates by reference various Symmetrix

product manuals, including the 5500 at page 4 line 20 to page 5

line 2. However, the Applicants have failed to provide any

copies of these manuals incorporated by reference.

Conclusion

33. Applicant's amendment necessitated the new ground(s) of
rejection presented in this Office action. Accordingly, **THIS
ACTION IS MADE FINAL.** See MPEP § 706.07(a). Applicant is
reminded of the extension of time policy as set forth in 37
CFR 1.136(a).

    A shortened statutory period for reply to this final action
is set to expire THREE MONTHS from the mailing date of this
action. In the event a first reply is filed within TWO MONTHS of
the mailing date of this final action and the advisory action is
not mailed until after the end of the THREE-MONTH shortened
statutory period, then the shortened statutory period will expire
on the date the advisory action is mailed, and any extension fee
pursuant to 37 CFR 1.136(a) will be calculated from the mailing
date of the advisory action. In no event, however, will the
statutory period for reply expire later than SIX MONTHS from the
date of this final action.

34. Any inquiry concerning this communication or earlier
communications from the examiner should be directed to Andrew
Caldwell, whose telephone number is **(703) 306-3036.** The examiner
can normally be reached on M-F from 9:00 a.m. to 5:30 p.m. EST.

    If attempts to reach the examiner by phone fail, the
examiner's supervisor, Meng-Ai An, can be reached at (703) 305-
9678. Additionally, the fax numbers for Group 2100 are as
follows:

        Official Responses: (703) 746-7239
        After Final Responses: (703) 746-7238
        Draft Responses: (703) 746-7240

    Any inquiry of a general nature or relating to the status of
this application should be directed to the Group receptionist at
(703) 305-3900.

Andrew Caldwell
703-306-3036
April 23, 2002

ZARNI MAUNG
PRIMARY EXAMINER